

WHAT IS CLAIMED IS:

- 5 1. A cast enclosure formed in a mold or die for housing components of a power unit suitable for battery replacement applications, wherein said enclosure comprises wall portions defining a plurality of internal subcompartments for receiving said components.
- 10 2. The enclosure as defined in claim 1, wherein said subcompartments comprise cavities within said enclosure for receiving said components.
- 15 3. The enclosure as defined in claim 1, wherein at least some of said subcompartments comprise conduits for containing materials selected from the group consisting of gases, fluids, plumbing and wiring.
- 20 4. The enclosure as defined in claim 1, wherein said enclosure is assembled from a plurality of cast sections.
- 25 5. The enclosure as defined in claim 1, wherein said enclosure is formed from cast metal.
- 30 6. The enclosure as defined in claim 1, wherein one of said components is a power unit and wherein one of said subcompartments is configured to receive said power unit.
7. The enclosure as defined in claim 6, wherein said power unit comprises a fuel cell stack and wherein one of said compartments is configured to receive said fuel cell stack.
8. The enclosure as defined in claim 1, wherein one of said components is a fuel storage device and wherein one of said

subcompartments is configured to receive said fuel storage device.

- 5 9. The enclosure as defined in claim 1, wherein the weight of said enclosure when housing said components approximates the weight of an electric vehicle traction battery.
- 10 10. The enclosure as defined in claim 1, wherein said wall portions are of varying thickness such that voids between said components within said enclosure are minimized.
11. The enclosure as defined in claim 1, further comprising a vibration dampener located in at least some of said subcompartments.
- 15 12. The enclosure as defined in claim 11, wherein said vibration dampener comprises a particle bed.
13. The enclosure as defined in claim 1, wherein said enclosure comprises a base and wherein said enclosure further comprises vibration isolators mounted on said base.
- 20 14. The enclosure as defined in claim 1, wherein said enclosure further comprises vibration isolators located between at least some of said components and said wall portions.
- 25 15. The enclosure as defined in claim 1, wherein said enclosure comprises integral mounting points.
16. The enclosure as defined in claim 15, wherein said mounting points are located on an outer surface of said enclosure.
- 30 17. The enclosure as defined in claim 1, wherein said enclosure is formed from a material having a high thermal mass.

18. The enclosure as defined in claim 17, wherein said enclosure is formed from cast metal.
- 5 19. The enclosure as defined in claim 1, wherein said enclosure comprises recessed surfaces and removable external cover plates securable to said recessed surfaces.
- 10 20. The enclosure as defined in claim 17, further comprising channels formed in said wall portions for circulating a heat transfer fluid therethrough, wherein thermal energy is transferable from said subcompartments housing heat generating components to said wall portions through said heat transfer fluid.
- 15 21. The enclosure as defined in claim 20, further comprising a radiator thermally coupled to said heat transfer fluid.
- 20 22. The enclosure as defined in claim 17, wherein said enclosure houses at least one heat generating component within one of said subcompartments, wherein thermal energy is transferable from said heat generating component to an ambient environment by conduction through said wall portions, and wherein an outer surface of said enclosure comprises fins to facilitate thermal transfer to said ambient environment.
- 25 23. A power unit for providing electrical power to a dynamic load comprising:
 - 30 (a) at least one heat-generating component adjustable between different operating states depending upon the power requirements of said load;
 - (b) a cast enclosure comprising wall portions defining a plurality of internal subcompartments, wherein said heat-generating component is housed within one of said subcompartments; and

(c) a thermal sub-system for rejecting heat from said heat-generating component to said wall portions of said enclosure.

- 5 24. The power unit as defined in claim 23, wherein said thermal sub-system rejects heat from said thermal sub-system to said wall portions by conduction or convection.
- 10 25. The power unit as defined in claim 23, wherein said thermal sub-system comprises at least one channel formed in said wall portions for flowing a heat transfer fluid therethrough.
- 15 26. The power unit as defined in claim 25, wherein said thermal sub-system further comprises a radiator separate from said wall portions through which said heat transfer fluid is circulated.
- 20 27. The power unit as defined in claim 23, wherein said enclosure comprises outer surfaces and wherein heat transferred to said wall portions is dissipated to an ambient environment surrounding said enclosure by convection and radiation over said outer surfaces.
- 25 28. The power unit as defined in claim 23, wherein said thermal subsystem is located within said enclosure and is sized to reject less than the maximum amount of heat produced by said heat-generating component under high load conditions.
- 30 29. The power unit as defined in claim 28, wherein said thermal subsystem is sized to reject approximately the average amount of heat generated by said heat-generating device during an operating session of said power unit.

30. The power unit as defined in claim 29, wherein said power unit is a hybrid system and wherein said heat-generating device is a fuel cell.
- 5 31. The power unit as defined in claim 25, further comprising a controller for controlling the amount of said heat transfer fluid circulated through said channel.
- 10 32. A cast enclosure assembly comprising a plurality of cast enclosures as defined in claim 1, wherein one of said cast enclosures encloses a power unit and another one of said cast enclosures encloses a fuel supply for said power unit.
- 15 33. An electric lift vehicle having a battery tray sized for receiving a traction battery, wherein said vehicle further comprises a cast enclosure as defined in claim 1 positioned in said battery tray.
- 20 34. The vehicle as defined in claim 33, wherein said vehicle further comprises a vibration isolator positioned between said cast enclosure and said battery tray.
- 25 35. An electric lift vehicle having a battery tray sized for receiving a traction battery, wherein said vehicle further comprises a power unit as defined in claim 22 positioned in said battery tray.
- 30 36. The vehicle as defined in claim 35, wherein said power unit approximates the weight of an electric vehicle traction battery.
37. A method of regulating the temperature of a power unit having at least one heat-generating component, said method comprising
- (a) providing a cast enclosure for enclosing said power unit, said enclosure comprising wall portions defining a

subcompartment for holding said heat generating component;

(b) rejecting heat from said heat-generating component to said wall portions; and

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(c) transferring said heat from said wall portions to an environment surrounding said enclosure.

38. The method as defined in claim 37, wherein said heat is transferred from said wall portions to said environment during periods when said heat-generating component is in an idle or shut-down mode.

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39. The method as defined in claim 38, wherein the step of rejecting said heat comprises conveying a heat transfer fluid through said wall portions.

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40. The method as defined in claim 38, wherein said heat-generating component is a fuel cell stack and wherein said heat transfer fluid is passed relative to said fuel cell stack.

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41. The method as defined in claim 39, further comprising controllably adjusting the amount of said heat transfer fluid circulated through said wall portions depending upon the operational state of said thermal subsystem.

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42. The method as defined in claim 39, further comprising circulating said heat transfer fluid through a radiator.

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